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CORONARY ARTERY DISEASE; PATTERN OF CLINICAL AND ANGIOGRAPHIC FINDINGS IN YOUNG MALES

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ABSTRACT... Objectives: This study was designed to evaluate the pattern of clinical presentation, risk factors and angiographic findings in young males presenting with acute myocardial infarction (AMI). **Materials and methods** This cross-sectional descriptive study was conducted at the Cardiology Department, Punjab Institute of Cardiology, Lahore from May 2005 till February 2006. After fulfilling the inclusion criteria 200 male patients ≤ 40 years with coronary artery disease (CAD) were studied. **Results:** Mean age of the study population was 31.5 ± 9.2 years with an age range of 31 to 40 years. Most common risk factor was smoking present in 60% patients. Family history of ischemic heart disease (IHD) was present in 44.5% patients, hyperlipidemia in 35.5% patients, hypertension in 25.5% and diabetes mellitus in 17.5% of patients. Common mode of clinical presentation was AMI 42.5% patients. Left anterior descending (LAD) was diseased in 73.5%, followed by Left Circumflex (LCx) 51% and Right Coronary Artery (RCA) in 39% patients. Left Main Stem (LMS) disease occurred in 9.5% patients. Good left ventricular (LV) systolic function was observed in 38%, moderate LV systolic function in 34% and poor LV systolic function in 14.5% patients. **Conclusion:** Patients with premature coronary artery disease have unheralded acute onset of symptoms. Smoking is the most common risk factor. Young patients have single vessel CAD with frequent involvement of LAD and commonly have good left ventricular systolic function.

Key words: Premature coronary artery disease; Coronary risk factors; Coronary angiography; Ischemic Heart Disease; young age.

INTRODUCTION

Cardiovascular diseases are major causes of morbidity and mortality causing more than 25% of deaths in the Indian subcontinent^{1,2}. Atherosclerotic disease is expected to become the leading cause of global morbidity and mortality by 2020¹. According to an estimate, nearly one hundred thousand individuals suffered an acute myocardial infarction in Pakistan in the calendar year 2002³.

Premature coronary artery disease (CAD) is devastating, particularly because an otherwise healthy person in the prime of life may die or become disabled without warning.

Fortunately, the incidence of myocardial infarction and symptomatic CAD in young adults is only 4 to 8 % of all CAD cases^{4,5}.

There is a clear correlation between the incidence of coronary artery disease and existing cardiovascular risk factors⁶. In one local study, the proportion of major risk

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factors for CAD were: sedentary life style 72%, family history 42%, dyslipidemia 31%, obesity 24%, hypertension 19% and diabetes mellitus 15%. Proportions of the three major risk factors (smoking, hypertension and dyslipidemia) occurring singly, doubly and all three together in the study population were found to be 39%, 11 % and 1 %, respectively⁷.

Younger patients with CAD have a more atherogenic lipid profile than the older subgroup. Smoking and a family history of premature CAD are the most common associated risk factors⁸. In patients who suffer MI despite normal coronary angiography, smoking is a major risk factor. In contrast, in patients with extensive coronary artery disease on angiography but no MI, diabetes rather than smoking is the dominant risk factor⁹.

Acute myocardial infarction has a peculiar presentation in the young population with specific etiopathogenic, anatomic, and prognostic characteristics that differentiate these patients from the elderly¹⁰. Patients who undergo coronary angiography soon after acute MI typically have involvement of left anterior descending artery, the most frequently involved artery followed by right coronary artery. Single vessel disease was the most common pattern¹¹. Younger patients having less extensive coronary artery atherosclerosis with better prognostic probability should be evaluated angiographically for further definitive management in the form of revascularization¹².

MATERIAL AND METHODS

It was a cross-sectional descriptive study conducted at the Coronary Care Units, Cardiology Ward and Department of Cardiac Catheterization and Interventional Cardiology at the Punjab Institute of Cardiology Lahore from May 2005 to February 2006. Clinical and angiographic characteristics in 200 male patients were studied. All patients coming for coronary angiography of age ≤ 40 years with first episode of acute MI were studied. Patients with age >40 years, female gender, rheumatic valvular heart disease or history of previous percutaneous or surgical revascularization were excluded.

A full history was taken particularly age, occupation, address, history of smoking, diabetes mellitus, hypertension, ischemic heart disease and family history of ischemic heart disease. Acute MI was defined by World Health Organization criteria and was classified as ST-segment elevation or Non ST-segment elevation on the basis of the presence or absence of at least 1 mm of ST-segment elevation in two or more contiguous leads on initial electrocardiography. Location of acute MI was classified as anterior, inferior, or other. Family history was considered to be positive if at least one of first degree relatives had MI or documented IHD at less than 50 years of age or if two or more second degree relatives had similar history. Hypertension was considered to be present if patients had history of hypertension and were on anti-hypertensive drugs or if their blood pressure was greater than 140 mmHg systolic and 90 mmHg diastolic on three separate occasions. Diabetes mellitus was present if patients were already on treatment or if fasting blood glucose level was greater than 126 mg/dl. Hyperlipidemia was assessed by fasting serum cholesterol levels.

Smoking history was positive if patient was a current smoker or had quit smoking five years ago. Huqqa users were considered smokers. Obesity was positive if patients had body mass index of >30 kg/m². Electrocardiograph (ECG), cardiac enzymes and coronary angiography was performed for all patients. Coronary angiography was performed and films were reviewed by 2 cardiologists unaware of the study protocol.

The severity of disease was determined by angiographic diagnostic criteria as mild (30-50%), moderate (50-70%), severe ($>70\%$) and left main stem disease was diagnosed when there was 50% or more luminal obstruction. Status of left ventricular (LV) systolic function was assessed by right anterior oblique (RAO) LV angiogram. Left ventricular function was classified as good, moderate or poor. Data of each patient was entered on preformed proforma.

STATISTICAL ANALYSIS

The data was analyzed with Statistical Package for Social Sciences (SPSS) Version 12 for windows.

Continuous variables were expressed as mean±SD and categorical variables as frequencies and percentages. Demographic, clinical, electrocardiographic and angiographic variables were described.

RESULTS

Mean age of the study population was 31.5±9.2 years. Age was divided into four groups with significant number of patients in the age range between 31 to 40 years. (Table I).

Characteristics	Frequency (Percentages) n=200
Age mean years	31.5±9.2
Age group	
21-25	11 (5.5%)
26-30	43 (21.5%)
31-35	65 (32.5%)
36-40	81 (40.5%)
Smoking	120 (60%)
Hypertension	51 (25.5%)
Diabetes mellitus	35 (17.5%)
Family History of IHD	89 (44.5%)
Hyperlipedemia	71 (35.5%)
<i>IHD = Ischemic heart disease</i>	

Most common risk factor was smoking as it was present in 120(60%) of patients. Next common risk factor was family history of IHD observed in 89(44.5%) patients. Hypertension was present in 51(25.5%) patients. Diabetes mellitus was present in 35(17.5%) patients (Table-I). Twelve (6%) patients had no risk factor, 89(44.5%) had only one risk factor, 63(32.5%) had two risk factors. Twenty three (11.5%) had three risk factors while 13(6.5%) had four risk factors.

Table-II shows mode of clinical presentation of patients. Eighty five (42.5%) patients presented with ST segment elevation myocardial infarction, 15(7.5%) presented with non ST segment elevation myocardial infarction. Fifty two (26%) presented with symptoms suggestive of unstable

angina and 48(24%) with stable angina.

Clinical presentation	Frequency (Percentages) n=200
Stable angina	48 (24%)
USA	52 (26%)
NSTEMI	15 (7.5%)
STEMI	85 (42.5%)
<i>USA= Unstable angina; NSTEMI=No ST elevation myocardial infarction; STEMI= ST elevation myocardial infarction.</i>	

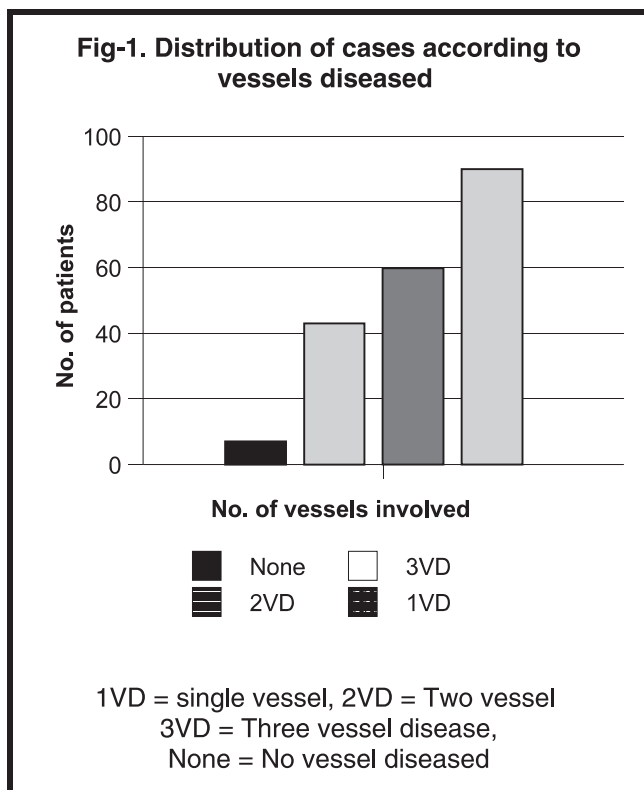
Table-III shows distribution of patients according to coronary artery involvement. Left anterior descending (LAD) was the most commonly diseased vessel.

Characteristics	Frequency (Percentages) n=200
Diseased Coronary artery	
LAD	147 (73.5%)
LCX	102 (51%)
RCA	78 (39%)
LMS	19 (9.5 %)
RI	14 (7%)
LV Function	
Mild dysfunction	21 (13.5%)
Moderate dysfunction	68 (34%)
Severe dysfunction	29 (14.5%)
Normal function	76 (38 %)
<i>LAD= Left anterior descending; LCx= Left circumflex artery; RCA=Right coronary artery; LMS=Left main stem; RI= Ramus Intermediate</i>	

A tight lesion of left anterior descending was present in 147(73.5%) patients. LAD was followed by Left circumflex (LCx) as it was diseased in 102(51%) patients. Right coronary artery (RCA) was diseased in 78(39%) patients. Left main stem (LMS) was diseased in only

19(9.5%) and ramus intermediate (RI) in 14(7%) patients.

Figure 1 shows the distribution of cases according to number of vessels involved. Single vessel disease was observed in 90(45%) patients, two vessel CAD in 60(30%), and three vessel CAD in 43(22.5%). Normal coronaries were observed in 7(3.5%) patients. Seventy six (38%) young males had good left ventricular (LV) systolic function, 68(34%) had moderate LV systolic function and 29(14.5%) had poor LV systolic function.



DISCUSSION

The study aimed to note risk factors, pattern of coronaries involvement and presentation of ischemic heart disease (IHD) amongst young males. We selected an age cutoff of 40 years to define a premature coronary artery disease based on previous epidemiologic studies. The dominance of single-vessel disease,¹³ the clinical presentation with an unheralded acute coronary syndrome at disease onset,^{13,14} and the distribution of risk factors^{13,15} in young patients observed in our study is consistent with findings by other authors.

In a local study the incidence of symptomatic IHD in the age group of less than 35 years was 3.5% of totally admitted patients¹⁶. In our study there were few patients under 30 years of age. Most of these patients were in 30-40 years age group. Atherosclerosis, is a progressive disease process that generally begins in childhood and has clinical manifestations in middle to late adulthood. The development of the concept or "Risk Factors" and their relationship to the incidence of coronary artery disease evolved from prospective epidemiological studies in the United States and Europe. In most instances, a risk factor is the trait that predicts the risk of development of clinically significant disease within a population. Used in this fashion, there are at least three independent predictors of risk for individuals within a population for the development of atherosclerosis.

These are plasma cholesterol concentration, cigarette smoking and elevated blood pressure. Lowering of lipid levels is now the aim in almost all patients with hyperlipidemia as it relates conclusively with the extent of disease and is considered fundamental to the process of atherosclerosis^{1,2}. Most of the patients had cholesterol level less than 220 mg/dl. It has been suggested that lipoproteins may not be a major contributory factor to coronary artery disease in our population or may be operative at lower level. In another study no significant difference of cholesterol levels was noted between patients of acute myocardial infarction and controls. Our study shows a much higher prevalence of hyperlipidemia in patients proven to have coronary disease as 31% individuals had total cholesterol above 200 mg/dl¹⁷. Local data indicate that risk factors prevalence for ischemic heart disease, although not as high as in the western countries, afflicts a considerable portion of our adult population. Available data suggests a higher prevalence of hypertension in Pakistan i.e, around 10% of the adult population of Pakistan. The Pakistan Medical Research Council (PMRC) health survey came out with definitive and representative data from all parts of Pakistan. The prevalence of around 10% in the entire population of Pakistan and 33% over the age of 45 is higher than in most parts of the world¹⁸. In our study hypertension was present in 25.5% patients. This is consistent with other reports¹⁹⁻²¹. Diabetes mellitus was observed in 17.5%.

Diabetes is known to have independent effect on atherosclerosis. It is commonly associated with other risk factors. It is especially important risk factor in females²². Smoking is considered to have a strong correlation with myocardial infarction. The relationship is more significant in case of males. PMRC study reported that for men smoking cigarettes, the chance of experiencing a major coronary event and sudden death due to any cause was consistently high in comparison to men who were nonsmokers²². Another study showed that the proportion of smokers was significantly higher among IHD cases (51.5%) as compared to controls (23.1%). A positive family history of ischaemic heart disease was given by 44% of the cases, as compared to 24.4% of controls^{22,23}. In our study 60.5% patients were smokers. Our study shows high prevalence of smoking in patients proven to have coronary disease. Smoking is a modifiable risk factor and efforts should be made to educate young males regarding hazards of smoking. A small number of patients in our study had 3 or more risk factors. That may be due to relatively younger age of the population studied.

The most frequently involved artery was left anterior descending artery. This finding is consistent with previously reported studies^{19,22-24}. In our study the most common coronary angiographic pattern was of single vessel disease. Three vessel disease was less common as only 22.5% had 3 vessels with angiographic coronary artery stenoses. Numerous studies have directly and indirectly related the arteriographic findings to risk assessment in patients with mild and severe coronary artery disease. The CASS registry has assessed risk in patients with more severe coronary disease, based on the number of diseased arteries and the ejection fraction. In our study most of the patients had good LV function at the time of angiographic study. Similar observations have been made earlier,²⁵ most patients presented with acute myocardial infarction.

STUDY LIMITATIONS

The results of our study apply only to patients referred for angiography. The study was designed to assess angiographic as well as clinical features in patients presenting with premature coronary artery disease. Therefore,

it was necessary to study patients who had undergone coronary arteriography. It is important to recognize that the selection process that led patients to first present themselves to a medical practitioner and then undergo coronary angiography imposes limitations on the interpretation of the data in relation to all older and younger patients with coronary artery disease in the population. Nevertheless, the fact that our results are similar to those found in large-scale epidemiologic studies suggests that the selection process may not have significantly biased the result.

CONCLUSION

Patients with premature coronary artery disease have unheralded acute onset of symptoms. Smoking is the most common risk factor. Young patients have single vessel CAD with frequent involvement of LAD and commonly have good left ventricular systolic function at the time of angiography.

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